branches called Brachyphyllum and the cones called Protodammara. This multinomial genus was thought by the authors to be "in all probability the last survivor of an ancient Araucarian line of descent, joined near its base with the primitive stocks of the Abietineous and Cupressineous series."

More recently JEFFREY has been able to study the wound reactions of Brachyphyllum and to draw from them more definite conclusions as to its relationships.[17] In a well-preserved specimen of the wood, Brachyphyllum can be distinguished at once from any living Araucarian by the absence of resiniferous elements other than those found in the pith-rays. In this feature the genus resembles such old gymnosperm groups as the Pteridospermae, Cordaitales, and Cycadales, and also the very ancient but still flourishing genus Pinus. JEFFREY further finds that Brachyphyllum agrees with the Abietineae in its traumatic reactions, resin-canals being formed as a result of wounding. Following the line of reasoning used in connection with his work on Sequoia,[18] he concludes that these reactions furnish one evidence that the Araucarieae are phylogenetically connected with the Abietineae; and that Agathis and Araucaria hold the same relation to Brachyphyllum that the other genera of the Cupressineae hold to Sequoia. This phylogenetic linking together of both the Cupressineae and Araucariaeae with the very ancient Abietineae is especially interesting on account of the very isolated position of existing Araucarians among existing Coniferales, and also on account of SEWARD's recently expressed views[19] in reference to the relationships and origin of the Araucarians.—J. M. C.

**Adsorption of chlorophyll.**—It has always been troublesome to explain the differential extraction of the chlorophyll pigments by their solvents under various conditions, and TSWETT seeks to supply a better theory.[20] Thus, fresh leaves or those ground in a mortar with sand or emery and covered with petrolether yield a more or less pure-yellow extract of carotin, with traces of other pigments. Dried leaves, even at a lower temperature, yield even purer carotin. But boiled leaves, or even warmed tissues, yield green extract. Alcohols (methyl, ethyl, and amyl), acetone, acetaldehyde, ether, and chloroform give a green extract with fresh, dry, or boiled leaves, dissolving all pigments freely. It suffices to add a little alcohol (10 per cent. for fresh, 1 per cent. for dry leaves) or the other solvents to petrolether to secure a beautiful green extract. How explain these facts?

If strips of filter paper be put into a flask with an alcohol-petrolether solution and the solvent evaporated *in vacuo*, the pigments become concentrated in the paper. This dry green paper now behaves toward solvents exactly as above stated for the green leaves. This, TSWETT holds, indicates that the pigments[23]

[17] JEFFREY, E. C., The wound reactions of Brachyphyllum. Annals of Botany **20**:383–394. *pls. 27–28.* 1906.

[18] See BOT. GAZETTE **38**:321. 1904.

[19] See BOT. GAZETTE **42**:224. 1906.

[20] TSWETT, M., Physikalisch-chemische Studien über das Chlorophyll. Die Adsorptionen. Ber. Deutsch. Bot. Gesells. **24**:316–23. 1906.

are absorbed by the stroma, i. e., held mechanically by molecular affinity, and in different degrees under different conditions, this molecular attraction being overcome by the various solvents unequally. Consequently, it is argued, the pigments cannot exist as grana in the stroma—a conclusion already indicated by recent study both with microscope and ultramicroscope. Many bodies beside cellulose hold the pigments in like fashion. The work is suggestive, but TSWETT'S crucial experiment is not convincing.

Inasmuch as the different pigments are held fast unequally, if a petrolether solution, or even better a solution in carbon bisulfid, be filtered through a column of calcium carbonate, the pigments are distributed in zones, the more firmly adsorbed ones above, the less firmly fixed successively lower. Such a preparation he calls a chromatogram, and the method the chromatographic method.[21]

In a later paper[22] TSWETT gives further details of the technique and analyzes the zones of his chromatogram. The synonymy of the chlorophyll pigments is so tangled that it is almost impossible to compare the work of different investigators. The chromatographic method promises to be of use in demonstrating that there are different pigments, but its value in research seems questionable. —C. R. B.

**The Svalöf Experiment Station.**—Although the work of the Swedish Agricultural Experiment Station at Svalöf is widely celebrated because of its noteworthy economic results, these results and the means by which they have been attained are not generally understood, owing to the fact that all of its reports are printed in the Swedish language. DE VRIES has devoted two recent papers[23] to a discussion of the Svalöf methods and their scientific significance. In the first of these papers is given a brief history of the station, together with an exposition of the methods employed. The history of the station falls rather naturally into four 5-year periods, each marked by a characteristic advance. During the first period, 1886–1891, the work of introduction and testing of varieties, in the way usually done by Agricultural Experiment Stations, presents nothing unique, the several sorts being treated as units. With the appointment of Dr. H. NILSSON as Director in 1890 begins the second period, in which the discovery was made that each variety is a mixture of a large number of elementary forms and that the latter are the real units with which scientific agriculture must deal. In the third period was carried out the great work of segregating the elementary

[21] TSWETT proposes to call the collective green pigment of leaves chlorophyll; the green fluorescent components chlorophyllins; the yellows already are distinguished as carotins and xanthophylls.

[22] TSWETT, M., Adsorptionsanalyse und chromatographische Methode. Anwendung auf die Chemie des Chlorophylls. Ber. Deutsch. Bot. Gesells. **24**:384–393. 1906.

[23] DEVRIES, HUGO, Die Svalöfer Methode zur Veredelung landwirthschaftlicher Kulturgewächse und ihre Bedeutung für die Selektionstheorie. Arch. für Rass. u. Gesells.-Biol. **3**:325–358. My-Je 1906.

Altere und neuere Selektionsmethode. Biol. Centralbl. **26**:385–395. Jy 1906.